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ABSTRACT

Based on a collaboration between an instructor and an undergraduate student for two different documentation projects, this paper discusses the difference between the language systems of writers and supervisors designing or choosing training materials and documentation and what the research says about the real needs for the documentation. The paper contends that professional writers can bring to an assignment a level of analysis identified as "symbolic analysis"--students must be taught that symbolic analysis is a large part of what they as professional writers apply to writing tasks. According to the paper, conventional wisdom about instructional writing found in technical writing textbooks is that instructions must be clear and easy to follow and that technical writing should be "task oriented." The paper examines projects for a tutorial for the Magdalena Ranger Station's new computer system and for a training manual and short course for Ktech Corporation, a subcontractor in Albuquerque of the Alcohol, Tobacco, and Firearms (ATF) agency. The paper concludes that "vast distances inevitably separate" the knowledge and experience that research and advanced practice have developed about the needs of users of instructions and end users, such as the ATF agents or the Magdalena Forest service workers. It suggests that when writers of instructions are themselves novices or scientists, not writers, knowledge about nonhierarchical structures, the need for silences in case narratives, and more falls by the wayside in favor of a few simple principles, such as "clarity" or "task orientation." (NKA)

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Instructional Writers' Narratives About Their Ideal Users and Users' Narratives About Their Ideal Instructions

Two months ago I began to collect information for two different documentation projects with an undergraduate student, Belinda. In both projects the users range from novice to experienced at two different government agencies. The first is the Magdalena Forest Service Ranger Station, where Belinda is writing a tutorial for their new computer system. Her tutorial will be developed for the entire office, but one major concern in the tutorial is to help the range agents who return to the office to complete their various reports. With the new computer system, the agents will complete their reports on it. The second documentation project consists of an analysis of some training materials and a manual for thermal measurements and analysis that Ktech Corporation, a subcontractor in Albuquerque, prepared for the Alcohol, Tobacco, and Firearms (ATF) agency, a federal agency that investigates fires and then testifies about them in court.

As Belinda and I spoke with the writers and supervisors for these two documentation projects, we began to realize a stunning difference in the way those writers and supervisors, when given the opportunity, talk about the instructional needs of their users, and the instructional needs, according to the research, of users, novice and experienced. This paper is a preliminary discussion of a compelling difference between the language

systems of our writers and supervisors designing or choosing training materials and documentation and what the research says about the real needs for the documentation. It is useful to look at some of these differences because they point up an area in instructional writing where we can see two things.

1. A large gap exists between what we know about users' needs in documentation and what we say about instructions, or the language that we privilege about instructions;

2. Professional writers can bring to an assignment a level of analysis which Johndan Johnson-Eilola, after Robert Reich, has identified as "symbolic analysis." We must teach our students that symbolic analysis is a large part of what they as professional writers apply to writing tasks.

The conventional wisdom about instructional writing, repeated frequently in introductory technical writing textbooks, is that instructions must be clear, easy to follow, transparent. But "clear and easy to follow," in which the prose does not get in the way of performing the actions, may not be that useful an approach. Paradoxically, many of those same introductory technical writing textbooks also explain that instructional writing is one the most complex to write. Research, especially in cognitive studies, has taught us a great deal about the ways people learn, which has had a powerful impact on research in instructional writing. Whether that research has been able to change everyday instructional writing, unarguably it has changed what professional writers do. None the less, because of what we say in textbooks and as conventional wisdom, a large body of the instructional writing goes on unaware of that symbolic analysis in advanced practice. Much of the research about instructional writing is highly specialized, with explanations

that have many layers of detail. Textbooks, however, often focus on clarity and ease of use, as the first principle of instructional writing.

The second principle found in recent textbooks about instructional writing argues it should be "task-oriented." Research in instructional writing has yielded a rich body of knowledge that has shown that a 'task-oriented" approach generally works best for instructions. That is, as Barbara Mirel says, "active learners" want to learn and do simultaneously. Therefore, the most effective instructions teach as the users are performing an everyday work task, learning to use the technology as they do their work.

The Forest Service Magdalena Ranger Station is re-automating. Their old "dumb" terminals with the green screens and function key operations are very gradually going away, on orders of the District, to be replaced by new computers with a Unix Windows system. Dome Salas, the Business Management Officer, must train all of her workers at the Magdalena Ranger Station to learn to use the new Windows computers to perform their jobs. Nervous about this because she knows the many levels of audience she must train to do their work on the new system, Dome has asked Belinda, my student, to write a tutorial for the Magdalena Forest Service Station for the new system, which Belinda is doing as a class project in instructional writing.

The users for the new system include the business management people in the office, the wildlife biologist, the archeologist, the fire management officers, and the range people, that is the agents out on the range who must return to the office to complete their various

reports. Dome is most concerned about this last group because, as she said, she would like to be able to go to the screen, find an icon, click on it, and create a document. She knows how to do that, believes she can learn easily how to do that on the new system, but she is fearful that her range people won't be able to move easily around the new interface on the new system. Dome told Belinda and me:

> Victor Chavez, one of the Magdalena Forest Service firefighters, can be sitting in The Magdalena Café on Route 60 and can find a fire anywhere in the San Mateo Mountains, with just a smoke signal. But if you tell him to log on to the computer, Victor won't know what I am talking about.

Dome is in charge of others learning the system. She told us:

> Say they want to create a letter now, they go to the system. But the new system will be a whole new one for them. Patty [one of the office business management people] is the only one the division has allowed to learn the system first.

Dome's concern about her "action-centered" users like the range people learning the new system is an example of what Shoshana Zuboff describes as transforming action-centered skills into intellective ones by "understanding the technological change as an occasion for developing a new set of skills" (70). Victor Chavez, the firefighter at the Magdalena Forest Service Ranger Station, may be about to see his work life completely changed by new automation, the new Windows computer system. Dome feels like Isaac, a manager at Zuboff's Piney Wood site, who said about his Piney Wood workers:

> They haven't learned to trust the machine to tell them what to do. This trust does not come naturally. It will only come when they really understand how it works.

And one Zuboff quote from Piney Wood sums it up for the Magdalena Forest Service as well. "'The computer makes your job easier . . . but it also makes things more complicated'"(81).

Zuboff and subsequent researchers talk about "informating" rather than automating, as a shorthand to describe a highly complicated writing analysis in which action-centered skill must become intellective skills for Forest Service range firefighters like Victor Chavez to gain the maximum job enhancement from the new computer system. Conventional wisdom about making the instructions clear and easy to follow may sound like the intuitive approach, but the task is much more complex if we are to help workers like Victor use the new computer system with as much facility and skill as he can find a fire from the Magdalena Café, where he sips his coffee.

Zuboff explains that for the action-centered to transform into the intellective the workplace must also transform into a non-hierarchical, non-status–based workplace where a premium is placed on collaboration and communication. My concern is that although the research clearly demonstrates this, the textbooks for undergraduate students like Belinda reduce this knowledge into the principles of clarity and ease of use. Given the needs of the Magdalena Forest Service Ranger Station and Dome, a tutorial for the new computer system can be clear and simple, but it might far more usefully break down some of the firewalls between job titles (business management, wild life biologist, etc.), promote an office that works more collaboratively, and provide user groups for the various people in the Ranger Station who want to learn the new system.

The second documentation project involves an analysis of some training and a manual for performing thermal measurements and analysis that Ktech, a subcontractor in Albuquerque, New Mexico, prepared for the Alcohol, Tobacco, and Firearms (ATF) agency, a federal agency that investigates fires and then testifies about them in court.

Ned and Bruce, the Ktech employees who created the training and the manual, a scientist and a computer scientist, are not, it is important to keep in mind, professional writers. The materials for the course were originally prepared for NASA, and, then, because ATF had different interests, the materials were refashioned for ATF. The ATF approximately 50 participants had been studying fire science at the University of Maryland. What the ATF wanted from Ned and Bruce at Ktech was to learn how to measure their fire accurately once they had learned what fire is. ATF asked Ktech if they would teach the ATF agents how to run data acquisition systems.

The ATF agents came to Albuquerque in summer, 1997, where they took the short course with Ned and Bruce for a week. Then, as a follow-up to the course, Ned and Bruce wrote and shipped the manual to ATF. It was meant for that percentage of ATF people who with more advanced training would become experts and then would help train their peers.

I became very interested in this project from the point of view of wanting to know how successful the manual could be as a follow-up to the short course. Ned told me that the course had the effect of being a bit of a disappointment to the ATF agents. Ned said,

> They got upset because the course didn't provide easy answers. But thermal measurements are installation specific, so they couldn't be given easy answers. [What we had to teach them] flies in the face of what they learn in fire science, where fairly easy calculations have been developed. But generalizations can't predict specific instances. This is very frustrating to these people. Accuracy is about 23%. You measure the temperature of the sensor. It's only the temperature of the sensor.

Ned further said,

> We were trying to make them into skeptics and not to trust anything until you've tested it. We wanted to teach that there are no cookbook answers.

But the ATF agents had some concern about the relevance of the training in the short course to their jobs. As some of the comments on the ATF evaluations said, "I'm unclear whether or not it will be applicable to our function." Or that they, "needed to be walked through use more" or that the course needed to be "more directed toward us and what we do."

When I spoke with the ATF career development officer at ATF who arranged for the short course, he told me this specific ATF group was " at the cutting edge of a certain technology" because the agents at ATF are becoming experts in fire origin and cause.

Although the short course seemed to bring home to the ATF agents the difference between fire science and fire measurements and analysis, the manual, shipped after the course, tries to provide the necessary step-by-step process for applying the science to measurements and analysis. However, since the short course, the ATF agents have continued to take courses, and the Ktech manual has gone largely unused so far.

Again, the ATF/Ktech experience points up a gap between what we know about documentation for users like those ATF Certified Fire Investigators (CFIs) and the application of that knowledge. The ATF people, motivated, becoming expert at fire investigation, but novice computer users, had the objective to be able to give "good, accurate, and understandable testimony in court," according to Bruce.

As Barbara Mirel has pointed out in a very recent *JBTC* (January 1998) article, "'Applied Constructivism' for User Documentation: Alternatives to Conventional Task Orientation," for

> . . . documentation for complex tasks (knowledgeable work) . . .and. . . for nonroutine tasks and the experienced users who want to perform them, writers need to reconceive how they represent tasks, and they need to reinvent their rhetoric of instruction. . .The designs and content will differ in kind, not just degree, from current task-oriented manuals and help systems (9).

Mirel explains that the constructivist approach appreciates the need for methods that allow users "to integrate knowledge in new ways" and to choose "between options based on circumstantial issues, not causal or conditional rules" (15).

Finally Mirel describes the need " to leave space (narrative silence) for users to fill in with their own contextually dependent interpretations and choices. These spaces, or silences, are intrinsic to narratives; they are the gaps in thickly described stories, cases, or experiences that provide layers of possible meaning depending in how readers complete them" (14).

Mirel advocates "the silences in case narratives" that "reveal uncertainty—an inescapable aspect of complex activity" (44) as an approach that can help address the vast distances between the knowledge of science and the uncertainly of applications that the ATF agents discovered when they sought to learn how to perform thermal measurements once they had studied what fires are according to fire science.

Ned and Bruce, although not professional writers, tried to bridge some of that distance between fire science and fire measurement in their manual. Here's an example of how the manual ties to teach the ATF agents how to use the technology to "smooth noisy data," whereby they can then convert the raw data into an Excell spreadsheet and then convert the raw data into a "smooth" graph or one that reduces the "noise."

The "silences in case narratives" that Mirel recommends, like the noise in the measurement data, are reduced here. When the ATF agents who will use this manual, or that "one-half or one-third of them who sometime down the line will become expert users who teach their peers," (as Bruce said) use this manual, they may want to create those silences in case narratives with this information about data acquisition and analysis for thermal measurement and analysis.

The problem is that vast distances inevitably separate the knowledge and experience that research and advanced practice have developed about the needs of users of instructions and end users, such as the ATF agents or the Magdalena Forest service workers. Whether for the agents at the remote Magdalena Forest Service Ranger Station learning the new

computer system or the ATF agents learning thermal measurements and analysis, we know far more complex knowledge than what general textbooks or general knowledge privileges when clarity, ease-of-use, or task-orientation are stressed. However when writers of instructions are themselves novices or scientists, not writers, our knowledge about non-hierarchical structures, the need for silences in case narratives, and much more, unfortunately falls by the wayside in favor of a few simple principles, such as "clarity" or "task-orientation."

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